



# COMPARATIVE EVALUATION OF TREATMENT OF PERI-IMPLANTITIS USING SURGICAL THERAPY VS PHOTODYNAMIC THERAPY: A CASE REPORT

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## ABSTRACT

Peri-implantitis is an inflammatory process caused by microorganisms affecting the tissues around an osseointegrated implant in function, resulting in loss of supporting bone. The present study compared two treatment modalities for treatment of peri-implantitis. **Aim:** To compare the effects of Photodynamic therapy versus conventional therapy in treatment of peri-implantitis. **Materials and Method:** In this case report two different periodontal treatment modalities were carried out on a 57-year-old male patient presenting with peri-implantitis in the maxillary arch. He received initial non-surgical periodontal treatment followed by photodynamic therapy using laser on left side and conventional surgical therapy on the right side. **Results:** Photodynamic therapy with laser showed better results than Surgical therapy. **Conclusion:** This case report showed that newer treatment modalities like photodynamic therapy are as efficient a treatment modality for peri-implantitis as conventional surgical therapy.

**KEYWORDS:** Peri-implantitis, Photodynamic Therapy, Indocyanine Green.

## INTRODUCTION:

Dental implants provide an alternative and a predictable treatment option for replacement of missing teeth with a high success rate. However, oral implants may fail as a result of biological complications such as peri-implant mucositis and peri-implantitis. Peri-implant disease following successful integration of an endosseous implant is the result of an imbalance between the bacterial challenge and the host response. Peri-implant diseases may affect the peri-implant mucosa only (peri-implant mucositis) or also involve the supporting bone (peri-implantitis). Peri-implantitis is defined as the inflammation of the mucosa as well as the characteristic loss of supporting bone around a dental implant.

Berglundh et al. proposed the following criteria for diagnosis of peri-implant diseases, a minimum of 2.5-mm peri-implant bone loss, probing depth (PD)>6 mm, and bleeding on probing (BOP)/suppuration.

Distinct differences in the incidence and prevalence of peri-implantitis have been reported by a number of previous studies. Data from a longitudinal study of 10 years including 101 subjects with 246 implants showed a prevalence rate of peri-implantitis as 4.7%, 11.2% & 15.1% respectively, among healthy, moderate & severe periodontally compromised individuals. A higher frequency of occurrence of peri-implant diseases was recorded for smokers. These findings show that peri-implantitis is not uncommon following implant therapy.

It is unknown to what extent bacterial and non-bacterial residues have to be removed from an implant surface to obtain a predictable and stable clinical result after treatment.<sup>8</sup> Decontamination by mechanical, chemical, and physical methods have been used. Surgical intervention has also been considered. Cleaning rough implant surfaces is very difficult since bacteria are protected in micro-irregularities or undercuts on the surface.

Laser technology has been introduced in medicine and dentistry as a means of both diagnosing and treating several diseases. The use of high power lasers such as Nd:YAG and diode lasers for bacterial reduction has been described previously and has opened up a new possibility in periodontology by eliminating bacteria from tissues through heating.

Photodynamic therapy (PDT), which involves the use of low power lasers with appropriate wavelength to kill cells or microorganisms previously treated with a photosensitizer drug, is a viable alternative approach. The excited photosensitizer reacts with the substrate, mostly oxygen or water, to produce highly reactive oxygen species, as free radicals and/or singlet oxygen. These compounds cause injury and death of microorganisms. The selective action of PDT, which does not affect normal cells, is one of the most important characteristics of

this therapy.

In this case report we report on a split mouth design for treatment of peri-implantitis with surgical therapy on one side and photodynamic therapy on the other.

## CASE DESCRIPTION:

A 64-year-old systemically healthy patient reported to the out patient department of Terna Dental College with a complaint of missing teeth. On further examination an implant supported over-denture was observed in the maxillary arch.

On removal of the prosthesis four implants in the posterior region, two on either side were observed. The implants showed the presence of inflammation, bleeding on probing and thread exposure.

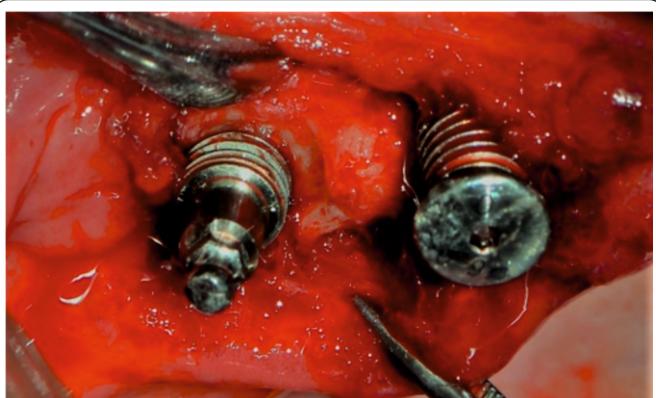
## Pre-surgical phase:

A thorough scaling of the implant surface was performed for all 4 implants and the patient was recalled 8 weeks later for further evaluation and treatment. The implants showed the presence of pockets (Table - I) on revaluation and thus further treatment was initiated.

## Surgical Therapy:

Surgery was performed under local anaesthesia (2% lignocaine/adrenaline). A crestal incision was made through the mucosa using a Bard-Parker blade (No. 15). The positions of the incisions were dependent on the pocket depth as well as the width and thickness of the peri-implant mucosa. Flaps were designed to optimize the removal of the pocket epithelium and the inflammatory granulation tissue from the inner aspects of the mucoperiosteal flap and from the peri-implant defect. Mucoperiosteal full-thickness flaps were reflected buccally and palatally/lingually. The granulation tissue was removed using hand curettes (**Hu-Friedy**<sup>®</sup>, Chicago, IL, USA). The implant surfaces were scaled and polished with titanium curettes (**Hu-Friedy**<sup>®</sup>, Chicago, IL, USA). Demineralised Freeze Dried Bone allograft (Tata Memorial Hospital (TMH) Tissue Bank, Mumbai) was placed in the angular bony defects and the flaps were approximated and sutured.

Following surgery, the patient was prescribed systemic antibiotic coverage of amoxicillin 500 mg and metronidazole 400 mg once daily for 10 days and rinsed twice a day for 1 min with chlorhexidine 0.12% for a period of 2 weeks. The sutures were removed 7 days after the surgery. The patient was recalled after 6– weeks.



Surgical Therapy



Photodynamic Therapy

**Photodynamic Therapy:**

Photodynamic Therapy using 810 nm diode laser and Indocyanine green (Aurogreen Aurolab Madurau, India) as photosensitizer was carried out. Indocyanine Green photosensitizer was prepared by mixing 5mg of the dye powder with 5 ml of distilled water. Indocyanine Green was placed into the peri-implant defect as far as the bony border with a Blunt Cannula. The paste was left in place for 5 minutes and then the implant surface was irradiated with a diode laser as carried out by Thierbach and Shingnapurkar et al. The patient was recalled after 6 – weeks.

**RESULTS:****Table 1**

Implant in the Region of	Pocket Probing Depth in mm	
	Pre-op	6 week - Post-op
15	6 (Image-1a)	3 (Image-1b)
16	5 (Image-2a)	5 (Image-2b)
25	5 (Image-3a)	2 (Image-3b)
26	5 (Image-4a)	2 (Image-4b)



(a)



(b)

IMAGE-1



(a)



(b)

IMAGE-2



(a)

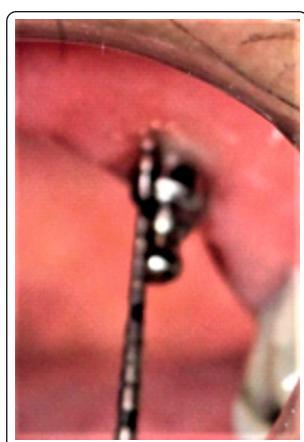


(b)

IMAGE-3



(a)



(b)

IMAGE-4

**DISCUSSION:**

In the treatment of peri-implantitis we encounter diverse therapeutic objectives aimed at the infectious character of the disease, in which the detoxification and treatment of the implant surface is important.

Lasers are currently used in dentistry and their use has extended to the treatment of peri-implant diseases. For instance, Thierbach and Eger<sup>14</sup> divided twenty-eight patients with peri-implantitis into two categories: those having peri-implantitis with pus formation and those without. Both groups were treated using the same protocol initially after microbiologic diagnosis. All patients were treated at baseline with full-mouth scaling and root planing. Two months later, full-mouth scaling and root debridement and antimicrobial photodynamic therapy was applied. The study indicated that the presence of pus influences the clinical outcome of the treatment of peri-implantitis. According to this investigation, non-surgical treatment of peri-implantitis may be effective when the peri-implantitis lesion has no pus formation but not when pus is present. Nevertheless, when the lesion is associated with pus formation, it can be successfully treated with a supplementary access flap surgery following an additional observation time of 3 months.

Shingnapurkar et al<sup>15</sup> conducted a study to evaluate the effect of indocyanine green-mediated photodynamic therapy as an adjunct to scaling and root planing in the treatment of chronic periodontitis. They used Indocyanine green and 810 nm diode laser which resulted in significant clinical improvement in patients with chronic periodontitis, suggesting that PDT can be used as an adjunct for the nonsurgical treatment of chronic periodontitis.

The concept of photodynamic therapy (PDT) is based on the application of light (generally red light with wavelength ranging between 630 and 700 nm) on a chemical dye (photosensitizer [PS]), which leads to the production of singlet oxygen molecules under aerobic conditions. These molecules have been reported to cause oxidative damage to the target cells, such as microbial cells and tumor cells. PDT has been shown to be a non-invasive and practical and feasible treatment option for periodontitis. Although clinical and experimental studies have investigated the efficacy of PDT in the management of peri-implantitis, there seems to be a lack of consensus among clinicians and researchers in identifying PDT as a treatment of choice for peri-implantitis. The factors associated with this discrepancy include variation in the study design, duration/frequency of treatment, selection criteria of control group and the laser-related parameter, such as type of laser. Thus, further long-term randomized controlled trials are needed to assess the role of PDT in the treatment of peri-implantitis.

**CONCLUSION:**

This case report presented that Photodynamic therapy can be a viable alternative to surgical therapy.

**REFERENCES:**

- Snauwarter K, Duyck J, van Steenberghe D, Quirynen M, Naert I. Time dependent failure rate and marginal bone loss of implant supported prostheses: a 15-year follow-up study. *Clin Oral Invest* 2000;4:13–20.
- Buser D, Weber HP, Donath K, Fiorellini JP, Paquette DW, Williams RC. Soft tissue reactions to non-submerged unloaded titanium implants in beagle dogs. *J Periodontol* 1992;63:225-235.
- Zitzmann NU, Berglundh T. Definition and prevalence of peri-implant diseases. *J Clin Periodontol* 2008;35:286-291.
- Lindhe J, Meyl J. Peri-implant diseases: Consensus Report of the Sixth European Workshop on Periodontology. *J Clin Periodontol* 2008;35:282-285.
- Berglundh T, Persson L, Klinge B. A systematic review of the incidence of biological and technical complications in implant dentistry reported in prospective longitudinal studies of at least 5 years. *J Clin Periodontol* 2002;29:197-212.
- M.Roccuzzo, N.De Angelis, L.Bonino, M.Aglietta. Ten-year results of a three-arm prospective cohort study on implants in periodontally compromised patients. Part I: Implant loss and radiographic bone loss. *Clinical Oral Implants Research*, 21(5), 2010, 490-496.
- M. A. Atieh, N. H. Alsabeeha, C. M. Faggion Jr., W.J. Duncan. The frequency of peri-implant diseases: a systematic review and meta-analysis. *J Periodontol* 2013; 84(11):1586-1598.
- Mombelli A. Microbiology and antimicrobial therapy of peri-implantitis. *Periodontol 2000* 2002;28:177-189.
- Mombelli A, Lang NP. The diagnosis and treatment of peri-implantitis. *Periodontol 2000* 1998;17:63-76.
- Moritz A, Gutknecht N, Doertbudak O. Bacterial reduction in periodontal pockets through irradiation with a diode laser: A pilot study. *J Clin Laser Med Surg* 1997;15: 33-37.
- Kimura Y, Yonaga K, Yokoyama K, Kinoshita J, Ogata Y, Matsumoto K. Root surface temperature increase during Er:YAG laser irradiation of root canals. *J Endod* 2002;28: 76-78.
- Sarkar S, Wilson M. Lethal photosensitization of bacteria in subgingival plaque from patients with chronic periodontitis. *J Periodontal Res* 1993;28:204-210.
- Soukos NS, Wilson M, Burns T, Speight PM. Photodynamic effects of toluidine blue on human oral keratinocytes and fibroblasts and *Streptococcus sanguis* evaluated in vitro. *Lasers Surg Med* 1996;18:253-259.
- Thierbach R, Eger T. Clinical outcome of a nonsurgical and surgical treatment protocol in different types of peri-implantitis: a case series. *Quintessence Int* 2013; 44:137–148.
- Shingnapurkar SH, Mitra DK, Kadav MS, Shah RA, Rodrigues SV, Prithyani SS. The effect of indocyanine green-mediated photodynamic therapy as an adjunct to scaling and root planing in the treatment of chronic periodontitis: A comparative split-mouth randomized clinical trial. *Indian J Dent Res* 2016;27:609-17.
- Sicilia A, Noguerol B, Rodríguez ME. Puesta al día en Periodoncia: Periimplantología. *Periodoncia* 1994;4:12-26.
- Siddiqui SH, Awan KH, Javed F. Bactericidal efficacy of photodynamic therapy against *Enterococcus faecalis* in infected root canals: a systematic literature review. *Photodiagnosis Photodyn Ther* 2013;10:632-43.
- Sperandio FF, Huang YY, Hamblin MR. Antimicrobial photodynamic therapy to kill Gram-negative bacteria. *Recent Pat Antiinfect Drug Discov* 2013;8:108–20.
- Figueiredo Souza LW, Souza SV, Botelho AC. Randomized controlled trial comparing photodynamic therapy based on methylene blue dye and fluconazole for toenail onychomycosis. *Dermatol Ther* 2014;27:43–7.
- Esposito M, Grusovin MG, De Angelis N, et al. The adjunctive use of light-activated disinfection (LAD) with FotoSan is ineffective in the treatment of peri-implantitis: 1-year results from a multicentre pragmatic randomised controlled trial. *Eur J Oral Implantol* 2013;6:109–19.